DNA Decoding via Electrification of Metal-Liganded Genetic Samples within Capture Medium

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Simon Edwards
Research Acceleration Initiative

Introduction

A method is called for which would enable the complete and rapid assessment of a genetic sample, including and especially of human DNA, without the need to chemically unravel the genetic material. Although advancements have been made which make conventional DNA less costly, theoretical proposals including optical methods fall short because of the high degree of interference caused by the jumbled and unpredictable configuration of coiled DNA.

Abstract

Although optical sensors have greatly improved over the past 15 years in terms of resolution and despite the improvement of active measurement methods including spectroscopic methods, these methods are, unfortunately, unsuitable for reading DNA which remains in its natural, coiled configuration.

Each chemical of the four unique DNA nucleotides has unique chemical properties which make it possible for metallic compounds capable of producing electromagnetism when electrified to uniquely bind to each of these nucleotide types. Under the proper conditions, a metal-rich liquid solution can be made to rapidly diffuse into a DNA sample captured through a sniffer. The customized compounds would bind exclusively to only one of the four possible nucleotide types. The production of modest amounts of phononic activity can enhance the diffusion of the metallic compounds within the sniffer in order to bring about more rapid liganding.

Once this process is complete or near-complete, the electrified mesh of which the sniffer is composed may introduce a modest electrical current to the coiled DNA through spontaneously self-assembled nanowires which lead from the mesh to the DNA mass. As current passes through each of the metal-liganded nucleotides, the result is a unique electromagnetic emission which is detectable via nano-antenna. No matter the configuration of the jumble of DNA, the sequential order of nucleotides can be assessed by the relative arrival time of radio signals emanating from the material at one or more radio detectors embedded within the fabric. Although DNA could not be expected convert sufficient amounts of electricity into electromagnetism in its own right to be capable of performing this function without the aid of the metallic ligands, once they are bound to the metallic molecules, the DNA strands would serve the function of conducting current to the metallic molecules which would serve the function as acting as the transmitting antennae.

Each of the four unique metallic compounds would tend to emit electromagnetism at a slightly different frequency relative to input voltage and would also emit electromagnetism for different periods of time after a pulse is introduced as they would have unique levels of capacitance. Both of

these factors could be used in conjunction with one another along with taking measurements from various surrounding points and comparing the received data in order to determine which compound is being electrified and in what sequence. The compound identified would then be used as a proxy to determine whether adenine, cytosine, thymine or guanine was present at a particular point in the genetic sequence.

In order for this method to be effective, it would be necessary for the voltage to be applied to only one point at a time in the nucleus. It does not matter at which point a nanowire is attached to the DNA mass, but it is important that electricity be introduced only at one, specific, point in order to prevent interference. The formation and insertion of the needed nanowire could be achieved through the use of the same phononic energy used to encourage metallic solution diffusion in order to bring about the automatic formation of nanowires which would self-assemble and find their way into the cellular nucleus in order to establish a connection. Although each such self-assembling wire would only have a small chance of successfully establishing a singular connection to a DNA mass, as the overall sniffer mechanism would be a fabric which catches may cells, the overall mechanism would have many opportunities to form a wired connection to the DNA masses, much like a hand groping in the dark looking for dropped keys. Given enough opportunities, the nanowires can, per chance, form a successful connection to one of the captured DNA masses derived, typically, from airborne skin cells shed by the individual being assessed. If even a single connection is established to a captured DNA mass, useful telemetry can be generated by electrifying the metal-liganded sample.

Conclusion

The practicality of this approach would depend upon the ability to infuse a DNA sample with the necessary liganding molecules thoroughly in a sufficiently brief period of time. It should be noted, however, that even if the saturation process is chemically incomplete, partial results might be obtained through this method which would be sufficient to establish a high-probability match when a sample of the subject's DNA is known to the operator. As chemical saturation continues, an increasing level of probability can be assigned to the sample with a moderate-probability match being determined in about five minutes and a full-confidence match in about 15 minutes.

Such a capability would allow for the identity of friend and foe alike to be determined with sufficient rapidity to allow for critical decisions to be made in near-real-time with increased confidence.

To be clear, this method would not be useful for establishing a complete genetic profile of an untested individual, but could be used to rapidly assess whether a captured sample contains matching portions corresponding to a DNA profile on record.
This method may also be useful for rapidly determining the nature of a viral or bacterial infection in medical settings.